

forty figures, which clearly show the features upon which the diagnosis depends.

Hefte iii. and iv. form a single volume on the Coleoptera. The introductory pages contain useful figures, on which the structures used in diagnosis are named. The order is divided into Adephaga (Carnivora) and Polyphaga; then follow tables for the separation of the families, genera, and species. The true water beetles, that is, those species in which all stages are passed in water, are first considered; afterwards, those species in which the young stages are found in water, the adults being terrestrial; and, finally, those the whole life of which is passed under stones or on plants on the margin of water.

The single volume on the Trichoptera (Hefte v. and vi.) opens with a detailed description of the imago, following which are tables, supported by line figures, chiefly of wings and genitalia, for the separation of families, genera, and species. Six pages are devoted to the description of the egg masses of some families, genera, and species, and there follows a detailed description of the larva and tables for separating larvæ into their respective families, genera, and species. Lastly the pupa is described, and another series of tables enables the worker to identify the family or subfamily to which a pupa belongs, and he may then complete the identification either by reference to the genitalia of the imago (if they are already formed beneath the pupal cuticle) or to the larval cuticle. These excellent systematic accounts of the larvæ and pupæ, which occupy 112 pages, are alone sufficient to secure for the volume a hearty reception and commendation.

The volumes on the other orders of insects (Hefte vii., viii., and ix.) are on a plan similar to that of the two volumes above noticed, as also are the accounts of the Crustacea. For instance, the Phyllopoda (Heft x.) are divided into Euphyllopoda and Cladocera, each section being in turn subdivided into families, genera, and species, separate tables being given, where necessary, of the characters of male and female specimens. Two hundred and sixty-five outline drawings of the carapace, terminal hooks, setæ, antennæ, &c., make clear the references to these characters in the text.

The account of the Trematodes (Heft xvii.) is admirably arranged and complete. Tables giving the characters of the adult, and in some cases also of immature forms, are provided. There are lists of the Trematodes which have been found encysted in those birds, Amphibia, fishes, molluscs, and arthropods which are associated with fresh water, and there is a useful appendix on cercariæ. The utility of the volume would be increased if a "host-index" were added, by means of which the worker could ascertain what parasites had been recorded from the particular host which he happens, at the moment, to be examining.

The numerous figures, many of them original, which illustrate these volumes are of exactly the kind to elucidate the text; only very rarely is a defective figure met with; here and there a shaded drawing has become rather too dark in the course of reproduction, thus causing part of its detail to be

obscured. The generic and specific names adopted are thoroughly up to date. Synonyms are given in only a comparatively few cases, such as those in which a well-known name has been recently superseded; a few more cases would have been the better for similar treatment; for instance, such well-known names as *Paludina* and *Cyclas* might have been given as synonyms under *Viviparus* and *Sphærium* respectively. One regrets the disappearance of many well-established names, e.g. *Apus* is replaced by *Triops*, and the alteration of others, e.g. *Daphnia* to *Daphne*, *Anodonta* to *Anodontites*, *Artemia* to *Artemisia*; these changes in zoological nomenclature seem to be almost endless, and sometimes, as in the last-named case, to be of doubtful value.

The volumes are of handy size, about 8 inches by 4½ inches, suitable for the pocket; they are printed on thin paper, so that the largest (on the Trichoptera, 326 pp.) is only half an inch in thickness.

So considerable a proportion of the fresh-water fauna of Britain is found also in Germany that the student of the British fresh-water fauna may turn to these volumes with the assurance that, in most cases, he will find there the information he requires to enable him to identify his material. These excellent volumes are certain to prove of the greatest service to workers on the fresh-water fauna, not only of Germany, but of a wider area.

#### CRETAN ARCHÆOLOGY.

*Crete, the Forerunner of Greece.* By C. H. Hawes and Harriet Boyd Hawes. With a preface by Arthur J. Evans. Harper's Library of Living Thought. Pp. xiv+158. (London: Harper Bros., 1909.) Price 2s. 6d. net.

MRS. HARRIET BOYD HAWES, better known to us, perhaps, under her maiden name of Miss Harriet Boyd, and her husband, Mr. C. H. Hawes, have written a very useful little book which may be described as a short, popular description of the antiquities of Crete which have been discovered during the last ten years by Dr. Evans, Prof. Halbherr, and by the distinguished author herself. More popular than Prof. Burrows's admirable "Discoveries in Crete" (though, at the same time, in no way less useful to archæologists), and published at half the price of even his book, "Crete, the Forerunner of Greece," should bring the interest and the importance of the Cretan discoveries home to the minds of all. Mr. and Mrs. Hawes have rightly insisted on the fact that the Cretan discoveries should in reality interest us more than similar discoveries in Assyria, or Palestine, or even in Egypt, because the Cretan civilisation of the Bronze age was the forerunner and the ancestor of that Hellenic culture which is ours to-day. In spite of the dark age of mediævalism in Europe, the tradition of Græco-Roman civilisation survived, and we have now returned to it. Greek culture was but a revival, after an analogous dark age of mediævalism, of the great civilisation of the Ægean Bronze age, younger sister, probably, of the ancient culture of the Nile valley. Our civilisation goes back in Greece to the very beginning of things, almost to

the remote epoch when it diverged from the Nilotic culture, and Mr. and Mrs. Hawes's little book is designed to instruct those who wish to know the story of its origins. *Felix qui potuit rerum cognoscere causas.* Religious ideas have largely directed the general interest in our origins towards the "Bible-lands," whence sprang the exotic oriental religious element in our culture, but the growth of knowledge and of civilisation is steadily weaning us from our Semitic and mediæval foster-parents, and interesting us more and more in Greece and Rome, the real parents of our minds and thoughts; and the origin of Greece and of Rome was Crete, and Crete may have sprung from the same common source as Egypt.

Of the Egyptian inspiration which we see in the early art of Crete the authors of this little book say little. They have no space in which to discuss disputed points, and their personal bias is, perhaps, rather away from any even so-called "oriental" influences (we do not admit, by the way, that Egypt was ever "oriental" in the sense that the Semitic world was and is). They merely describe what has been found in Crete and is to be seen there, either in the ruined palaces of Knossos and Phaistos, or in the towns of Gournià and Palaikastro, or in the museum of Candia, where the treasures found in the course of the excavations of these places are preserved. They conclude with a chapter on Cretan (Minoan) art which strikes us as very correctly appreciative of the peculiar genius of the earliest European artists, so unequal in quality, so good, so magnificent in conception and workmanship at times, at others so weak; yet honest and free, unshackled by any of the conventions that bound the artists of Egypt and Assyria (who, but for these conventions, would have done as well as the Minoans), and the worthy ancestors and forerunners of the artistic genius of Hellas. On this we must always insist; the Minoan art of Greece was the ancestor of that of the Hellenes, who inherited their artistic genius, not from the Indo-European Greek-speaking northern originators of half their blood, but from their other ancestors, the ruddy non-Aryan Mediterraneans, brothers of the Egyptian and of the Etruscan. It is from these, albeit we ourselves in the north have little or none of their blood in our veins, that we have derived most of what makes us civilised beings.

#### PRACTICAL CURVE TRACING.

*Practical Curve Tracing, with Chapters on Differentiation and Integration.* By R. Howard Duncan. Pp. vii+137. (London: Longmans, Green and Co., 1910.) Price 5s. net.

THE methods employed in this book, which presents an attractive appearance, are almost entirely independent of the aid of general mathematical principles. For instance, the form of the graph of  $y=ax+b$  and its dependence on  $a$ ,  $b$  are explained by plotting graphs of the equations obtained by varying  $a$  while  $b$  remains constant, and then those obtained by varying  $b$  while  $a$  remains constant.

Naturally greater difficulties occur in handling the equations  $y=ax^2+bx+c$ ,  $y=ax^3+bx+c$ , &c., by the same method. Inexpert mathematical students of the type for whom the author writes find it very hard to get hold of the notion of a parameter, and a great deal could certainly be done by adopting the plan indicated above, and steadily followed in this book. Even the ordinary student of analytical geometry would probably get at "the facts of the case" sooner if he approached, for example, the equation  $x^2+y^2-ax-b=0$  by drawing graphs of the circles of the specified system, keeping  $b$  a positive constant and giving  $a$  various values, then keeping  $b$  a negative constant and varying  $a$ .

It is this positive and distinct advantage that is emphasised by the author, and from this point of view are discussed the parabolic, hyperbolic, exponential, and logarithmic curves, together with the sine curve, of the natures of which a good account is given. For students of graphs who have at their disposal algebraic machinery up to division and quadratic equations, the road to a knowledge of the forms of many graphs could be made shorter. The artifices of change of origin and scale-unit, even without those of successive approximation, do not offer a great difficulty to a student of small mathematical ability, and go a long way towards establishing the rough form of the graph of an equation which would appear alarming if it had to be discussed by the plotting of points.

Two chapters on the calculus are added to those on curve tracing. The author knows that "the method of measuring the slope of a curve by actually drawing the tangent is sometimes objected to on the ground of inaccuracy"; but his experience "shows that by good and careful workmanship it is possible to rely on the results so obtained to a degree of accuracy which is sufficient for practical purposes." Yet the degree of accuracy indicated in some of the results tabulated in the chapter on differentiation must be very difficult to attain. Indeed, curves of  $y=x^2$ ,  $y=x^3$ , &c., are constructed, tangents are actually drawn,  $dy/dx$  and  $x$  are tabulated and then plotted against one another directly or logarithmically, with so much accuracy that the rules for the differentiation of  $x^n$ ,  $e^x$ ,  $\log x$ ,  $\sin x$ ,  $\cos x$ , are deduced. The reader certainly will have it very definitely impressed upon him that  $dy/dx$  measures the slope of a curve. Of course, there remains the difficulty for an engineer, or any other who applies the calculus, of being able to identify the slope with the rate of variation of the corresponding function, and of appreciating the very varied significance of the derivative in its applications; but the book does not profess to enter on this field.

A few examples on each chapter are gathered together at the end of the volume, the purpose of which is evidently that the reader should be clear regarding the facts at the base of the equations and functions discussed before he sets out to equip himself in the practice and applications of the methods explained.

P. P.